Warmup!

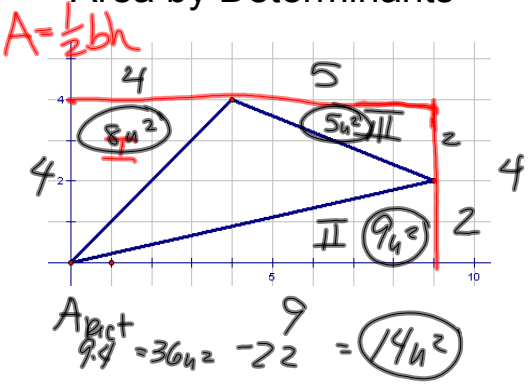
1. Find the determinant.

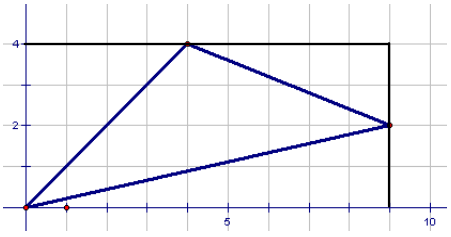
$$\begin{vmatrix} 3 & -4 \\ 8 & 6 \end{vmatrix}$$

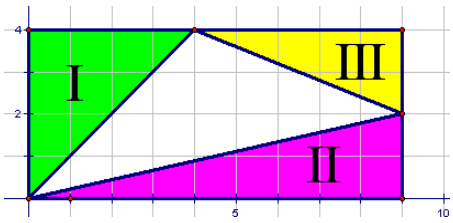
2. Find the determinant using the calculator.

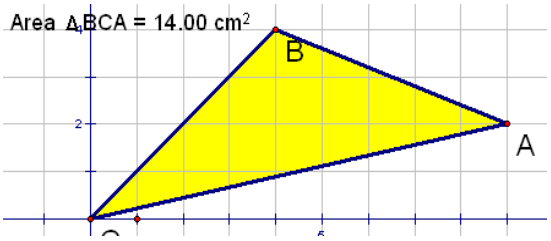
$$\begin{vmatrix} 5 & 2 & 6 \\ -1 & 4 & 0 \\ 8 & -3 & 2 \end{vmatrix}$$

Area by Determinants

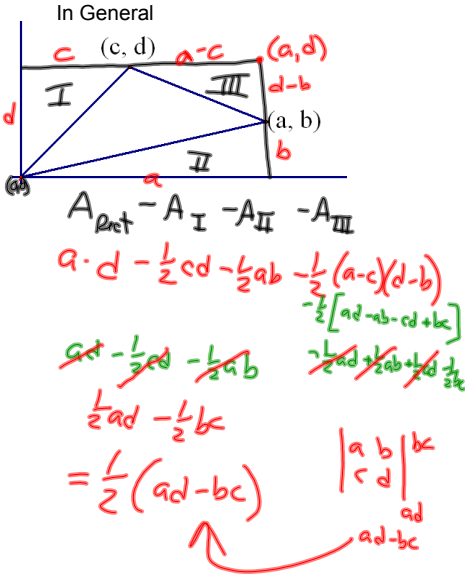








In General



(4,4)
(9,2)

$\frac{1}{2}\left|\begin{matrix}4 & 4\\ 9 & 2\end{matrix}\right|$ 36, 8

-28
-14 $14u^2$

Example:
Find the area
(0, 0), (5, 2) (4, 6)

$A = \frac{1}{2}\left|\begin{matrix}5 & 2\\ 4 & 6\end{matrix}\right|$ 8, 30

$A = 11u^2$

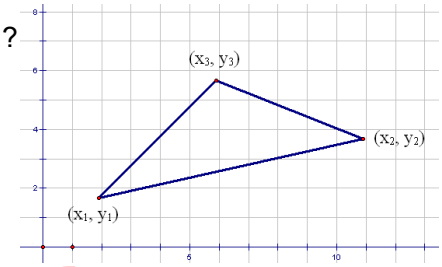
Do:
Find the area.
(0, 0), (5, -3) (-10, 9)

$A = \frac{1}{2}\left|\begin{matrix}5 & -3\\ -10 & 9\end{matrix}\right|$ 30, 95

15

$A = 7.5u^2$

What if...?



$$A = \frac{1}{2}\left[\left|\begin{matrix}x_1 & y_1\\ x_2 & y_2\end{matrix}\right| + \left|\begin{matrix}x_2 & y_2\\ x_3 & y_3\end{matrix}\right| + \left|\begin{matrix}x_3 & y_3\\ x_1 & y_1\end{matrix}\right|\right]$$

Ex:
Find the area:
(3, 8) (5, 1) (-1,2)

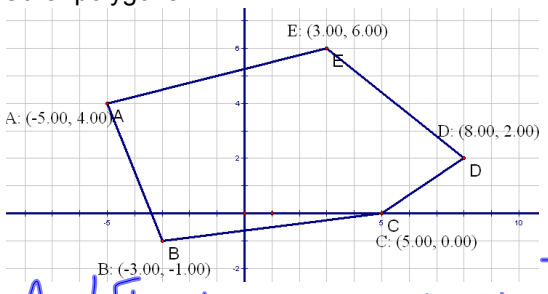
$A = \frac{1}{2}\left[\left|\begin{matrix}3 & 8\\ 5 & 1\end{matrix}\right| + \left|\begin{matrix}5 & 1\\ -1 & 2\end{matrix}\right| + \left|\begin{matrix}-1 & 2\\ 3 & 8\end{matrix}\right|\right]$

40, -1, 6
-37, 3, 11, 10, -14, 8

$\frac{1}{2} \cdot -40$

$A = 20u^2$

Other polygons



$$A = \frac{1}{2}\left[\left|\begin{matrix}-5 & 4\\ -3 & -1\end{matrix}\right| + \left|\begin{matrix}-3 & -1\\ 5 & 0\end{matrix}\right| + \left|\begin{matrix}5 & 0\\ 8 & 2\end{matrix}\right| + \left|\begin{matrix}8 & 2\\ 3 & 6\end{matrix}\right| + \left|\begin{matrix}3 & 6\\ -5 & 4\end{matrix}\right|\right]$$

17, 5, 10, 42, 42

$\frac{1}{2}$ 116

$58u^2$